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Abstract

ABOUT SOME DYNAMIC PROPERTIES OF A NUCLEAR POWER STATION WITH A HEAVY-WATER MODERATED, GAS-COOLED REACTOR

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This paper deals with the first Czechoslovak nuclear power station. Dynamic properties of the main technological equipment are briefly analyzed and the control system ensuring operation at the given power level of the turbo-generator is described in the introduction.

In the further part of this paper the authors analyze some transients of the atomic power station, provoked by the failing of the technological equipment, and of the regulating system.

In case of accidental shut-down of the reactor by the profecting system, there appear considerable changes in temperatures and pressures in the primary circuit. This provokes an unfavourable stress of structural parts of the reactor. There were analyzed different methods how to decrease and restrict the temperature shocks, either by the arrangement of design or by the quick restriction lowering the coolant flow.

The failing of one or two main circulation blowers is from the operation standpoint a probable failure, resulting in a considerable loss of the coolant flow in the reactor. The reactor regulating system specified for a normal operation is not able to settle these failures with allowable exceeding of temperatures of the fuel canning. Some results of measures for limiting this type of failure are introduced here.

An accidental cutting off of the turbine does not signify for the reactor any larger disturbance due to steam by-pass, designed for the full power. Some results for the regulation of the by-pass in the case of such a failure are briefly mentioned.

Even the influence of a failure of one of the twelve tubing loops upon the performance of the regulating system was taken into consideration.

A failure of the reactor outlet gas temperature regulator, resulting in the loss of the regulator output signal is the main failure of the regulating system. This failure leads to an instability of the whole regulated object. Measures for suppression of such a failure are analyzed.

The dynamic properties of the nuclear power station during non-nominal reactor power levels are shortly explained. In the conclusion there are appreciated regulating properties of this type of a nuclear power station in the electric power system.